Operating Manual

INSYS GSM small

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0 Safety Instructions !

GSM devices are subject to restrictions in the vicinity of electronic devices. The operation of a GSM device may lead to interferences which might impair electronic devices, such as PCs, controls, monitors, etc.

Attention!

The device may not be operated:

- in the vicinity of medical devices or life-saving equipment.
- at explosion-prone locations.
- at filling stations and fuel depots.
- at blast sites.
- in the vicinity of easily flammable substances and gases.
- on board of aircrafts.

Attention!

The physical contact to a connected GSM antenna or the FME connector on the front panel of the device must be absolutely avoided. A safe distance of at least 20 cm should be kept.

Please inform yourself about the currently effective safety regulations!

1 Scope Of Delivery

Before you begin with the installation and the initial operation, please check if all accessories are included in the box.

- INSYS GSM small
- RS 232 cable (9-pin plug on 9-pin jack)
- User Guide The most recent issue of the manual is also available for download at our internet site:

  http://www.insys-tec.de/manual

In case the content is not complete, please refer to your supplier.

Optional accessories:

- GSM antenna (outside mounted antenna or magnetic base antenna)

Please also check the device for shipping damage; please refer to your supplier if damage exists.

Please keep the packaging material for possible future dispatch or storage.

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2 General

The INSYS GSM small is a terminal device according to ETSI GSM Phase 2/2+ for the transmission of data, voice, fax group 3 and SMS messages in 900 MHz and 1,800 MHz networks (dual-band).

It has a very compact design, is only 23 mm wide and is designated for rail mounting. Installing the modem on the rail in the switchboard, as well as the connection and the initial operation of the modem are very simple.

It offers various capabilities, such as:

- Establishing a data connection
- Auto answer
- Data flow control
- Error Correction
- SMS dispatch
- Fax dispatch

3 Technical Data

3.1 General

3.1.1 Features

- Mounting on DIN rail DIN EN 500 22
- Power supply 12..24 V DC, 5% ripple
- Level on V.24 interface according to V.28
- Protected V.24/V.28 interface with 9-pin SUB-D jack (screwed)
- FME antenna connection
- Extended AT instruction set
- Call number display
- Auto answer
- Hardware/software handshake
- MiniSIM card reader with integrated slot (3 V SIM card)
- Automatic establishing of data connections via the DTR control line
- Automatic SMS dispatching via the DTR control line
- Integrated real time clock
- Reset terminal
- Sleep mode
- Power down mode
- Automatic reset, configurable

3.1.2 Mechanical Features

Weight	4.41 oz
Dimensions (maximum)	w x d x h = 0.91 x 4.72 x 2.95 in
Temperature range	32°F..131°F
Protective class	Housing IP 40/ Terminal IP 20
Humidity	0 - 95% non-condensing

Note: The INSYS GSM small may not be used in wet environments.

3.2   Interfaces and Display Elements

Front view

3.2.1 Display Elements

The left LED (Power - Rx/Tx) displays the condition of the operating voltage and a data transmission. The right LED (GSM net – DCD) displays the registration status within the GSM network and an existing data connection. The exact meaning of the display elements is described in the following table.

LED	Color	On	Blinking	Flashing	Off
Power – Rx/Tx	**green**	Operating voltage applied	- - -	- - -	No operating voltage applied
	orange	Device is in power down mode	- - -	Data is transmitted; LED flashes/flickers according to the clock pulse of the incoming/out going data	
	red	- - -	- - -	- - -	

LED	Color	On	Blinking	Flashing	Off
GSM network - DCD	**green**	Only with setting AT&C1 (default): Connection setup: Remote terminal has answered; connection handshake is taking place	With setting AT&C1 (default): Timing: 600 ms on / 600 ms off The device has not been registered in the GSM network (e.g. network loss, no SIM card inserted or no PIN entered).	With setting AT&C1 (default): Timing 75 ms on / 3 s off Device has been registered in the GSM network	No operating voltage applied
	orange	When the LED Power Rx/Tx is also orange: Device is in power down mode, otherwise: AT&C1 as well as ATC0: Data connection has been established and DCD is active In addition for setting AT&C0; Connection setup: Remote terminal has answered; connection handshake is taking place	Only for setting AT&C0: Timing 600 ms orange / 600 ms red The device has not been registered in the GSM network (e.g. network loss, no SIM card inserted or no PIN entered).	Only for setting AT&C0: Timing 75 ms orange / 3 s red Device has been registered in the GSM network	
	red	- - -			

3.2.2 Terminal Layout

The terminals are located on the upper side of the housing
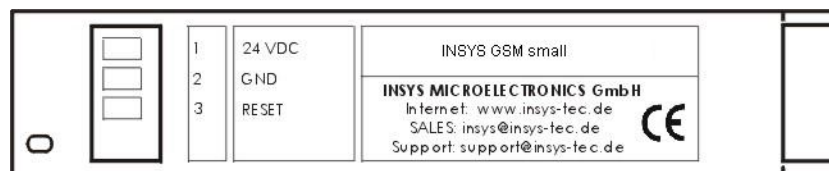
Attention: **The value for Pin 1 stated on the cover top is a maximum value.**

1	24V DC	Power supply 12V -24V DC
2	GND	Ground
3	RESET	Reset input

3.2.3 Power Supply

Power supply: 12..24 V DC (5% ripple)
Power consumption standby (logged in): . max. approx. 500 mW
Power consumption data connection (connect): max. approx. 2 W
Power consumption power down: max. approx. 200 mW
Power input sleep: max. approx. 300 mW

Input voltage	Current (standby, logged in)	Current (Data connection)	Current Power down	Current Sleep
12 V DC	40 mA	160 mA	11 mA	22 mA
24 V DC	20 mA	80 mA	8 mA	13 mA

This values have been established for a signal field strength of 20 (AT+CSQ). The current consumption and therefore the power consumption may increase for poor network conditions.

These are average values for estimating the current consumption. The used power supply unit should be able to supply up to 10 W at short notice (pulse duration 577 µs for period 4.67 ms) to ensure proper operation.

3.2.4 Reset Terminal

Terminal open/unwired: Normal state

Terminal connected to GND (terminal 2): Reset

Reset duration: minimum 300 ms

When the GND potential is removed once more, the device is in initial state.

ATTENTION! All settings that have not been stored will be lost during a reset.

The reset terminal is also used to bring the INSYS GSM small from the power down state into normal state.

The reset terminal is to be considered as replacement for the combination of the pins PD_IN and IGT for the Siemens Cellular Engines TC35i or TC35i terminal, respectively.

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3.2.5 SIM Card

The INSYS GSM small requires a SIM card from a GSM provider for operation. The SIM card is the identification towards the network provider.
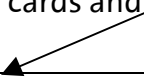
The slot for the SIM card is on the bottom of the INSYS GSM small. Push the sunk yellow button above the card slot to unlock and pull out the insert. The visible contacts of the SIM card must face the top, when inserting the SIM card into the holder. Push the card holder back into the card reader (contacts of the SIM card to the left), until the card holder is flush with the housing (see figure in Chap. 4.2)

The card holder (slot) is secured against falling out.

Note: **Only 3V cards may be used.**

Attention! **Change the SIM card only when the device is switched off, otherwise the SIM card could be damaged.**

The GSM provider has to enable the desired services for the SIM card. A card can be enabled for voice services (traditional GSM cards for mobile phones) and data services at the same time. The following cards and contracts are normally available:

Function	Prepaid card	Contract for data transmission
Outgoing data connection	✓	✓
Incoming data connection	-	✓
SMS	✓	✓

Note: In general, different phone numbers are assigned to the different services. The GSM network does not automatically switch e.g. the call of a modem to the voice number to the data number.

3.2.6 Antenna Interface

The antenna connector at the front of the INSYS GSM small is of type FME (male).

All commercial GSM antennas with a female FME connector can be used as antennas. Ensure that the frequency band corresponds with the one of the provider when using single band antennas (900 MHz or 1800 MHz).

3.2.7 Serial Interface

Layout of the 9-pin D-SUB jack

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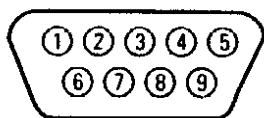
Description of the signals on the 9-pin D-SUB connector

9-pin D-Sub Pin No.	Description	Function	CCITT V-24	EIA RS232	DIN 66020	E/A DCE to DTE
1	DCD	Data Carrier Detect	109	CF	M5	O
2	RXD	Receive Data	104	BB	D2	O
3	TXD	Transmit Data	103	BA	D1	I
4	DTR	Data Terminal Ready	108	CD	S1	I
5	GND	Ground	102	AB	E2	
6	DSR	Data set ready	107	CC	M1	O
7	RTS	Request to send	105	CA	S2	I
8	CTS	Clear to send	106	CB	M2	O
9	RI	Ring Indication	125	CE	M3	O

Interface speeds of the INSYS GSM small:
300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400,
57600 and 115200 bps.
The baud rate indicates the transmitted bits per second (bps).

Auto baud (automatic baud rata detection) supports the baud rates
4800 bps to 115200 bps.

Data formats of the INSYS GSM small:
8N1, 8E1, 8O1, 8N2, 7E1, 7O1

For activated auto baud, the data format is also detected (exception: 8N2).

ATTENTION! To avoid problems due to undefined settings of baud rate and data format, we recommend to deactivate the auto baud function.

3.3   Transmission Standards and Protocols

The error correction in the GSM radio network via RLP (Radio Link Protocol) is available by default.

The support of the individual services depends on the technical support of the GSM provider and the enabling of the respective services in the SIM card contract.

3.3.1 Data Connections

Non-transparent asynchronous:
- V.22bis (2400 bps)
- V.32 (4800 bps)
- V.32 (9600 bps)
- V.32 (14400 bps)
- V.110 (4800 bps)
- V.110 (9600 bps)
- V.110 (14400 bps)

USSD (Unstructured Supplementary Services Data) are supported.

3.3.2 Fax

Group 3: Class 1 and Class 2

3.3.3 SMS

Text and PDU mode

- Mobile Originated (MO)
- Mobile Terminated (MT)
- Cell Broadcast (CB)

3.4   Approvals

The INSYS GSM small bears the CE symbol of conformity. This symbol is a declaration, that on account of its design and implementation, this device is in compliance with the currently valid versions of the following EC directives:

Directives:

- 89/336/EC   (EMC directive)
- 73/23/EC   (low voltage directive)
- 99/05/EC   (Telecommunications devices directive)

Standards:

- ETS 300 342 -1
- ETS 300,607 -1   (TBR 19/ TBR 20)
- ETS 301,489 -1
- ETS 301 511
- EN 55022   (class B)
- EN 55024

Approvals:

- CE

4 Installation and Initial Operation

Before the initial operation, familiarize yourself with the effective safety regulations for the operation of an GSM terminal device. Please also read the safety instructions in Chapter 0.

4.1   Connection Overview
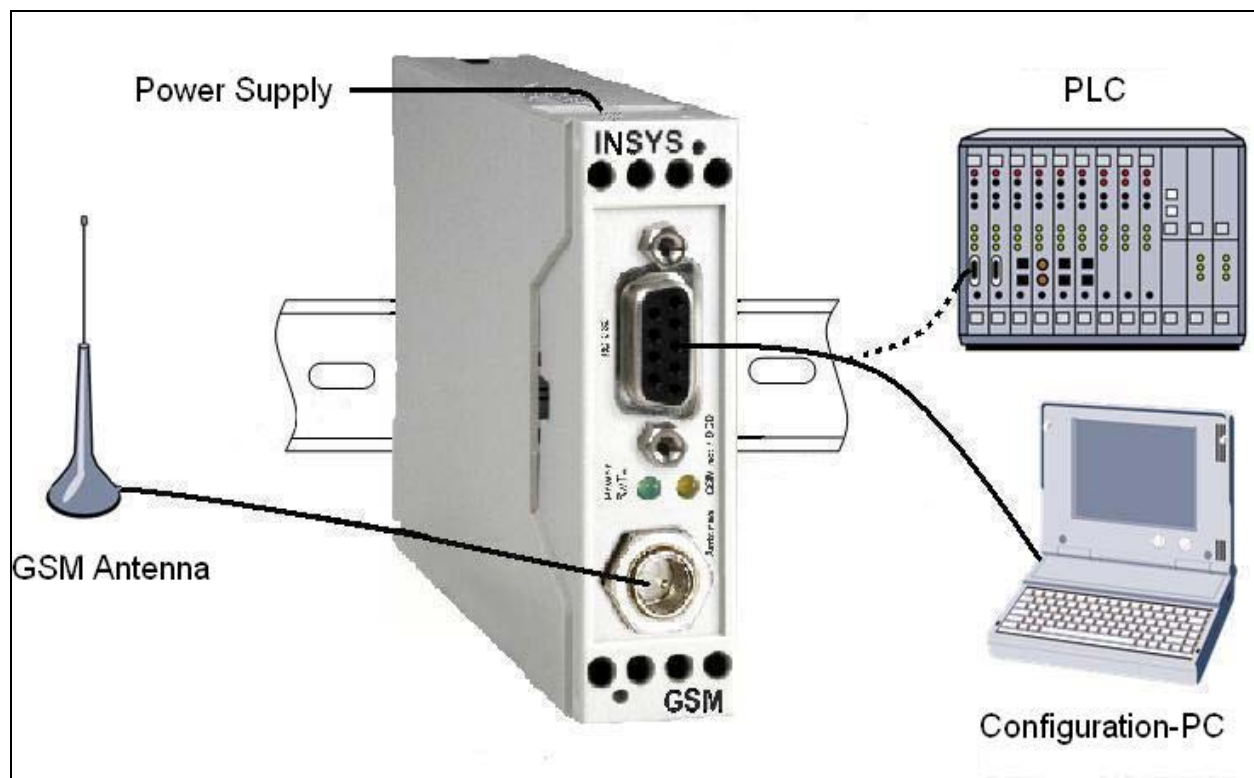
The serial interface (RS 232) of the INSYS GSM small and the configuration PC are connected for the initial operation and configuration. For the data communication during operation, the application (e.g. an SPS) is connected to the serial interface of the INSYS GSM (dashed line), instead of the PC.

4.2   Installation Steps

1.   Mounting on DIN rail:
      Simple snap-on

2.   Inserting the SIM card
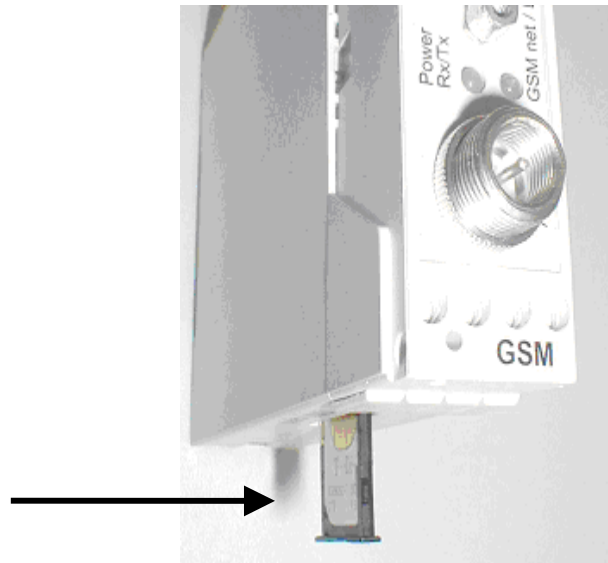
Attention! When the automatic module initialization sequence (see Chap. 4) is used to automatically transfer the PIN of the SIM card, this function must be deactivated for a while for a new SIM card with another PIN. This may otherwise lead to the blocking of the SIM card (after three incorrect inputs).

3.   Connection of Power Supply:

Attention!   The value for Pin 1 stated on the cover top is a maximum value.

   a) Connection of the ground wire GND at terminal 2.
   b) Connection of the power supply 12..24 V DC at terminal 1.
   c) Switching on the power supply
   After successful installation, the power LED will be green. The LED GSM net flashes green after approximately 5 s according to a clock pulse of 600 ms.

4.   Connect GSM antenna

         Connect the GSM antenna to the FME connector on the front panel.

5.   Connection PC/Terminal
         Plug the enclosed RS232 interface cable into the cover front, attach it with screws and connect it with the PC.

4.3   Initial Operation and Setup

The initial operation may take place comfortably by using the configuration software HSComm (see Chap. 5) under Windows as well as directly by entering the AT commands with a terminal program.

4.3.1 Initial Operation Using the Configuration Software HSComm

1. Start HSComm under Windows:

2. Select the following standard setting for the serial interface in the menu "Interface" at the configuration PC:

3. If the INSYS GSM small is in an undefined state, reset it optionally to the factory settings first (button "Send default settings"). If the INSYS GSM small does not respond to the transmission of commands, select the button "Synchronize RS232" to adapt the baud rate and the data format automatically.

4. Enter the PIN number (will be stored in the INSYS GSM small): Select the tab "Basic Settings", select "new PIN" and enter the PIN belonging to the SIM card (see image below). The PIN is stored in the INSYS GSM small and used for logging into the GSM network at every restart. Transfer settings by activating the button "Send settings". Afterwards, the device must be reset.

   Attention!   When using SIM cards with deactivated PIN query, the PIN does not need to be entered.
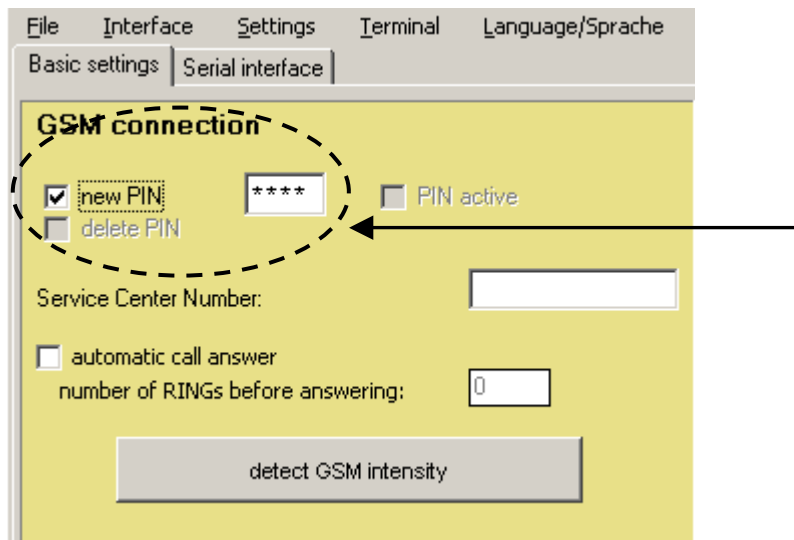
5. After the device has been reset, the INSYS GSM small registers itself at the GSM network. As soon as the device is registered, the LED GSM net changes from steady green blinking (600 ms) into green flashing (75 ms on, 3 s off).

6. Check the field strength of the GSM signal using the button "Detect GSM Intensity".
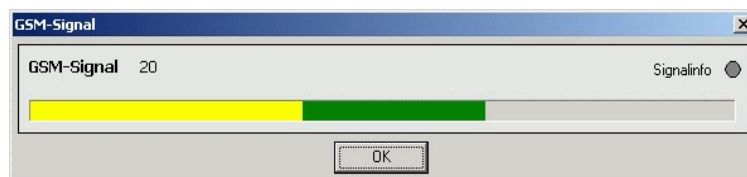
    The response should be a field strength of at least 12 – otherwise the antenna location has to be changed. (see also Chap. 5.2).

7. Establish a connection manually from the terminal window of the program:
    - Activate the cursor at the end of the terminal window by clicking on it.
    - Select the test number 22243 (national freenet access number from D1 and Vodafone) using the command: **ATD22243**<CR>
    - INSYS GSM small establishes the connection
    - After a little while (1 minute max.) the message „**CONNECT 9600/RLP**" is displayed and the GSM net – DCD LED is orange.
    - Enter „**+++**" to switch into the online command mode. The „**OK**" response is displayed.
    - Terminate the connection with the command: **ATH**<CR>

    In general, this connection test is successful. Chapter 4.3.3 shows some troubleshooting and diagnosis possibilities.

4.3.2 Initial Operation Using a Terminal Program

1. Start your terminal program with the interface parameters 19200 bps, 8 data bits, 1 stop bit, no parity.

2. Communication test
   For a first communication test, enter the command "**AT**" and hit the "Enter" key. The reply "**OK**" indicates that the INSYS GSM small has been successfully installed.

3. Entering the PIN:
   Attention! When using SIM cards with deactivated PIN query, the PIN does not need to be entered.
   Entering the SIM card pin takes place using the command:
   AT+CPIN="<PIN>"<CR>
   The input of **""** must be observed.
   When a correct pin is entered, **OK** will be reported back after up to 10 seconds.

4. Register/Unregister
   After the PIN has been entered, registering at the GSM network is required.
   Register: **AT+COPS=0**<CR>
   Unregister: **AT+COPS=2**<CR>
   After the command has been entered, "**OK**" will be reported back after up to 20 seconds.
   As soon as the INSYS GSM small is registered, the LED GSM net changes from steady green blinking (600 ms) into green flashing (75 ms on, 3 s off).

   Attention! This setting is immediately saved. If it is not changed, independent registering takes place after the PIN has been entered (**AT+COPS=0** has been entered one time).
   If in addition the PIN query of the SIM card has been deactivated, the INSYS GSM small registers itself independently at the GSM network, when a SIM card was inserted.

5. Baud rate
   The baud rate can be set to fixed values.
   Examples:
   AT+IPR=9600<CR> sets the baud rate to 9600 bps.

   AT+IPR=19200<CR> sets the baud rate to 19200 bps.

   AT+IPR=0<CR> sets auto baud.
   This setting is immediately saved.

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Attention! To avoid problems due to undefined settings of baud rate and data format, we recommend to deactivate the auto baud function, and to select a fixed baud rate.

6. Data format

The data format can be set to fixed values. Example:

AT+ICF=5,1<CR> sets the data format to 7E1 (7 data bits, parity even, 1 stop bit).

AT+ICF=3<CR> sets the data format to 8N1 (8 data bits, no parity, 1 stop bit).

For the first parameter, the following inputs are possible:

1   8 data bits, no parity, 2 stop bits → 8N2 (no second parameter required for this setting)

2   8 data bits, 1 stop bit, the second parameter determines the parity

3   8 data bits, no parity, 1 stop bit → 8N1 (no second parameter required for this setting)

4   7 data bits, 1 stop bit, the second parameter determines the parity

The second parameter determines the parity (when available):

O   Odd parity
E   Even parity
N   No parity

The following settings are possible:
8N1, 7E1, 7O1, 8E1, 8O1, 8N2

Attention!   The setting of the data format must be saved with AT&W.

If auto bauding is active (**AT+IPR=0**), this also applies for the recognition of the data format (except 8N2).

7. Connection Test

Perform a manual connection from the terminal program:

a. Select the test number 22243 (national freenet access number from D1 and Vodafone): **ATD22243**<CR>

b. INSYS GSM small establishes the connection

c. After a little while (1 minute max.) the message „**CONNECT 9600/RLP**" is displayed and the GSM net – DCD LED is orange.

d. Enter „+++" to switch into the online command mode. The „OK" response is displayed.

e. Terminate the connection with **ATH**<CR>.

4.3.3 Troubleshooting and Diagnosis during the Initial Operation

No response on commands

* INSYS GSM small and the terminal device (configuration PC or control) have to operate the serial interface with the same baud rate and the same data format, unless auto baud is not used. The used COM port may not be used by another application.

No connection

* Is the signal quality of the GSM network sufficient? See next page.

* Has the INSYS GSM small been registered? See next page.

* Has the SIM card been enabled for data connections: See Chap. 3.2.5.

* Was the phone number for data connection dialed? See Chap. 3.2.5.

* Is the power supply during sending sufficient? See Chap. 3.2.3.

SMS is not dispatched

* Has the number for the SMS service center been entered correctly? See Chap. 5.

* Deactivate the reaction to DTR drop, if the device is connected via a serial interface which does not support a DTR function.

* Deactivate handshake, when the device is connected via a serial interface which does not support hardware handshake (protocol).

Signal Quality

The query of the signal quality at the reception location takes place using the AT command: **AT+CSQ?**<CR>
Response:
+CSQ: x,y

x: signal quality at the reception location.
Value range from 0 ... 31

31...23:	very good quality
22...11:	normal
10...0:	bad; these values should be avoided after installation or mounting of the antenna at the operation location, in order to make sufficient reserves available for the application of the devices.

y: Bit error rate
Value from 0 ... 7 possible.
Only current when registered.

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Attention! Measuring of the signal quality should always take place in a registered status with a SIM card of the provider who is actually used.

A measurement without a SIM card will due to the emergency call functionality always supply the value of the strongest GSM network!

Registered status and PIN status

The registered status can primarily be checked through the LED GSM net.
The query via AT command will supply further information.

AT+CREG?`<CR>`

Response:

`+CREG: x,y`

`x:`   Setting of the result display; not important at this time

`y:`   Registered status

0 = not registered, no network search

1 = registered, home network

2 = not registered, network search active

3 = network refuses registration

4 = unknown

5 = registered, roaming

In case you are not registered, check with the command
AT+CPIN?`<CR>` if the device expects the input of a PIN.

Response:

`+CPIN: <status>`

`status:`

`READY`   no further input necessary

`SIM PIN`   Enter SIM card PIN

`SIM PUK`   Enter PUK of the SIM card ➔ the PIN has been repeatedly entered wrong and is locked now. To unlock, the PUK, which you find in the contract documents of your GSM provider is required. Remove the SIM card and enter the PUK using the menu of any commercial mobile phone. Absolutely ensure afterwards that the correct PIN is used.

5 Configuration Software HSComm

The software HSComm allows the configuration of the INSYS GSM small under Windows without explicit knowledge of the AT commands and their parameters. The requested functions and settings can be selected on a graphical user interface. The selected settings are translated to AT commands and sent to or read from INSYS GSM small after the appropriate instruction (buttons Send or Read settings).

The configuration software HSComm is available on the Internet for free download:

http://www.insys-tec.com/configuration

5.1   General Operation

5.1.1 Help

The context sensitive help is available any time via the key **F1** or the menu "Help".

Help also contains the complete command reference for the extended INSYS AT commands.

5.1.2 Menus
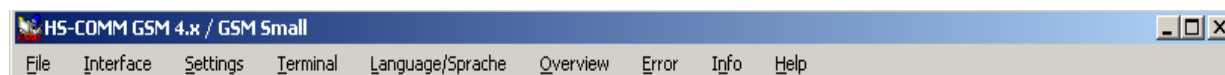
File
The current settings, as displayed in the HSComm user interface, can be saved as a file and read out again.

Interface

Setting of the serial interface which is used at the configuration PC. The baud rate and the format (data bits, stop bit, parity) have to match the settings of the serial interface at the INSYS GSM small.

Language

Image HSComm language selection

Selection of the HSComm user interface
language: German or English. The setting
has no effect on the functionality of the
INSYS GSM small.

Overview

All current settings of the INSYS GSM small are clearly displayed. The output extends
over several screen pages and can be saved as text file.

Note!   Read out the settings of your device and have this overview ready when
                   contacting our hotline!

Error

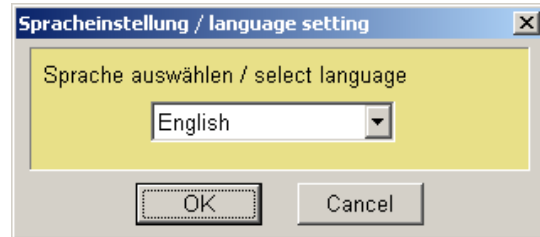When an error occurs during configuration, a menu with the error messages is displayed
as plain text.

5.1.3 Status Bar

The status bar at the lower window border of the HSComm displays the settings and
activities of the serial interface.

5.1.4 Buttons

Image HSComm buttons

Send settings

The current settings in the HSComm are transferred to the
INSYS GSM small.

Read settings

The current settings of the INSYS GSM small are read out and
displayed in the HSComm.

Send default settings

Factory settings (defaults) are loaded.

Reset

A software reset is performed in the INSYS GSM small. Afterwards, the device re-registers
at the GSM network if the PIN is stored.
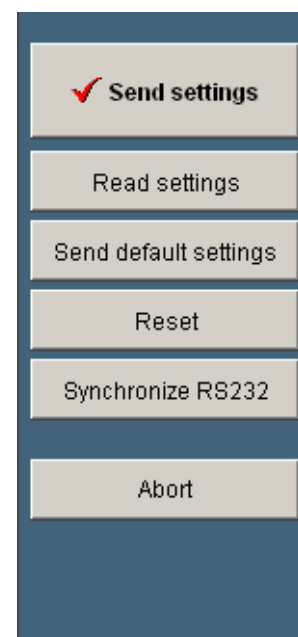
Synchronize

The serial interface of the INSYS GSM small and the used PC must have the same settings. With "Synchronize", all possible baud rate and data format settings at the PC side are tested through until both sides match.

Abort

Terminates a running data transmission ("Send settings", "Read settings", or "Send default settings"). This is indicated by the progress bar above the buttons.

5.1.5 Tabs
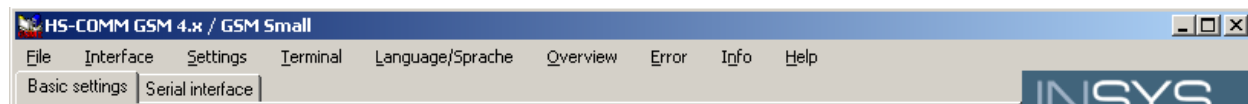
The settings of the basic and extended functions are spread across two pages, which can be selected via the tab titles. The settings are transmitted to the INSYS GSM small only after pressing the button "Send settings".

The functions are described in detail in the following chapters.

5.2 Basic Settings

5.2.1 GSM Connection
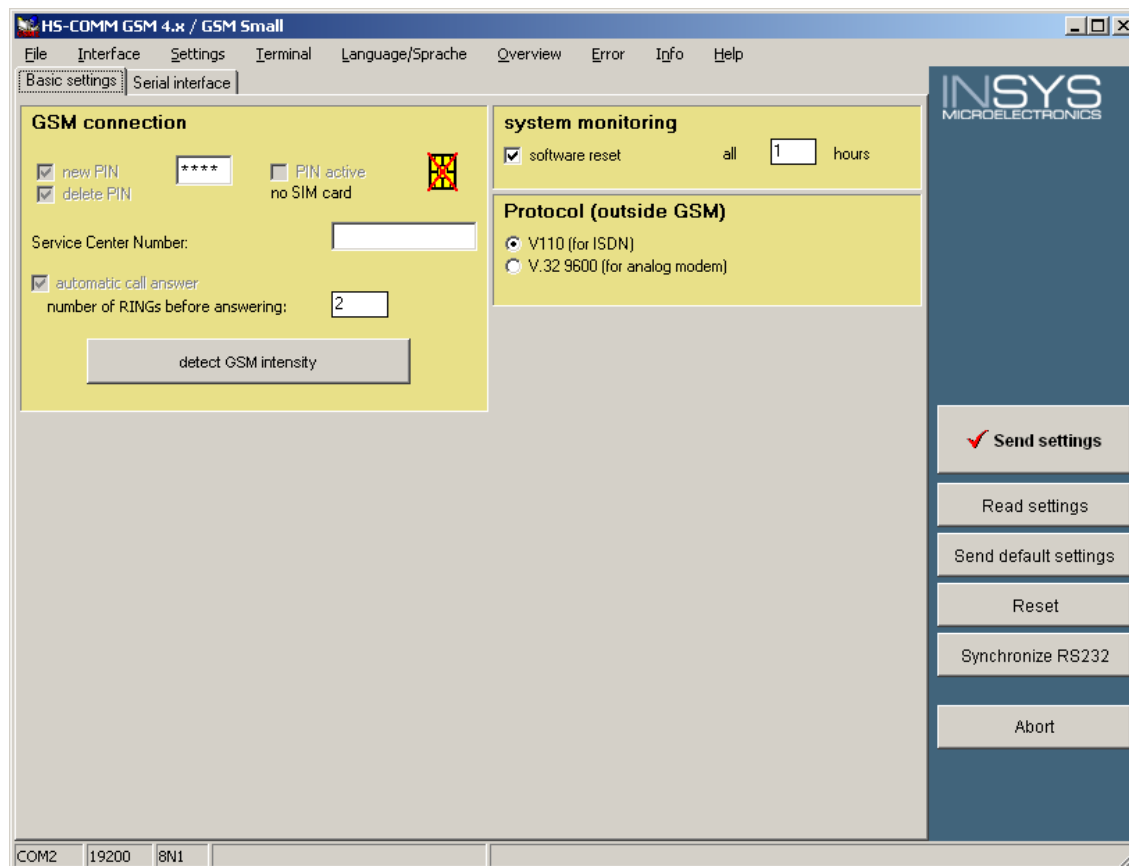
PIN

The INSYS GSM small can store the PIN of the SIM card internally to be able to automatically register at the GSM network during start up.

To enter, activate "new PIN" and enter the PIN. For safety reasons, ***** is displayed instead of digits. The default setting is "0000". When the INSYS GSM small has stored a PIN, the option "PIN active" is checked.

A PIN stored in the INSYS GSM small is deleted by "Delete PIN". This also enables the operation of SIM cards without PIN.

"PIN active" indicates that a PIN is stored. Below you will find the registered status in the following format:

GSM: registered	ready for operation
GSM: refused	GSM network does not allow access
GSM: not registered	SIM accepted but no access to GSM network
GSM: network search	Radio contact with GSM network too poor ➔ relocate antenna position
SIM PIN missing	Enter PIN number of the SIM card and restart device
SIM PUK missing	PIN of the SIM card is locked after repeated false attempts. To unlock, the PUK, which you find in the contract documents of your GSM provider is required. Remove the SIM card and enter the PUK using the menu of any commercial mobile phone. Absolutely ensure afterwards that the correct PIN is stored in the INSYS GSM.
SIM card missing	No SIM card in the device

Service Center Number

Entering the number of the SMS service center (SMSC) of the own GSM provider is required for sending alarm messages via SMS. Enter the number in international format (e.g. Germany: 0049). +49...) .

The SMSC for your SIM card are in the contract documents of your GSM provider.
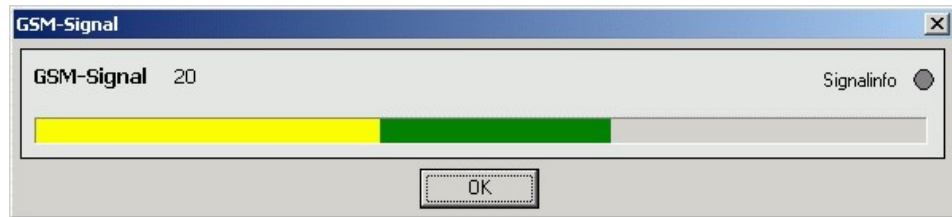
Auto answer

A data call is accepted by the INSYS GSM small after the set number of ring tones.

0	off
2..255	active

Detect field strength intensity

The actual field strength of the GSM signal is read out and displayed graphically. Values below 12 indicate an insufficient signal strength. The antenna location should be improved. The value 99 stands for not ascertainable field strength, e.g. due to network loss or a damaged antenna. When the location of the antenna is changed, it takes approximately 5 to 10 seconds until the field strength of the INSYS GSM small is updated.

5.2.2 System Monitoring

Software reset

Using a software reset, the INSYS GSM small unregisters for a short period and re-registers again daily to allow maintenance functions of the GSM provider. Enter the time interval after which another software reset should be performed (1 to 999 hours). Afterwards, the INSYS GSM small re-registers at the GSM network, if the PIN of the SIM card is stored.

For the value "0" no software reset is performed.

Attention! When the INSYS GSM small has not been registered for a longer period, it can not update the updates from the GSM network provider and some functions may have errors.

5.2.3 Connection Protocol

For a data connection with a device outside the GSM network (analog modem or ISDN TA) the right protocol has to be selected. This setting is not important for data connections with a GSM device.

5.3   Serial Interface
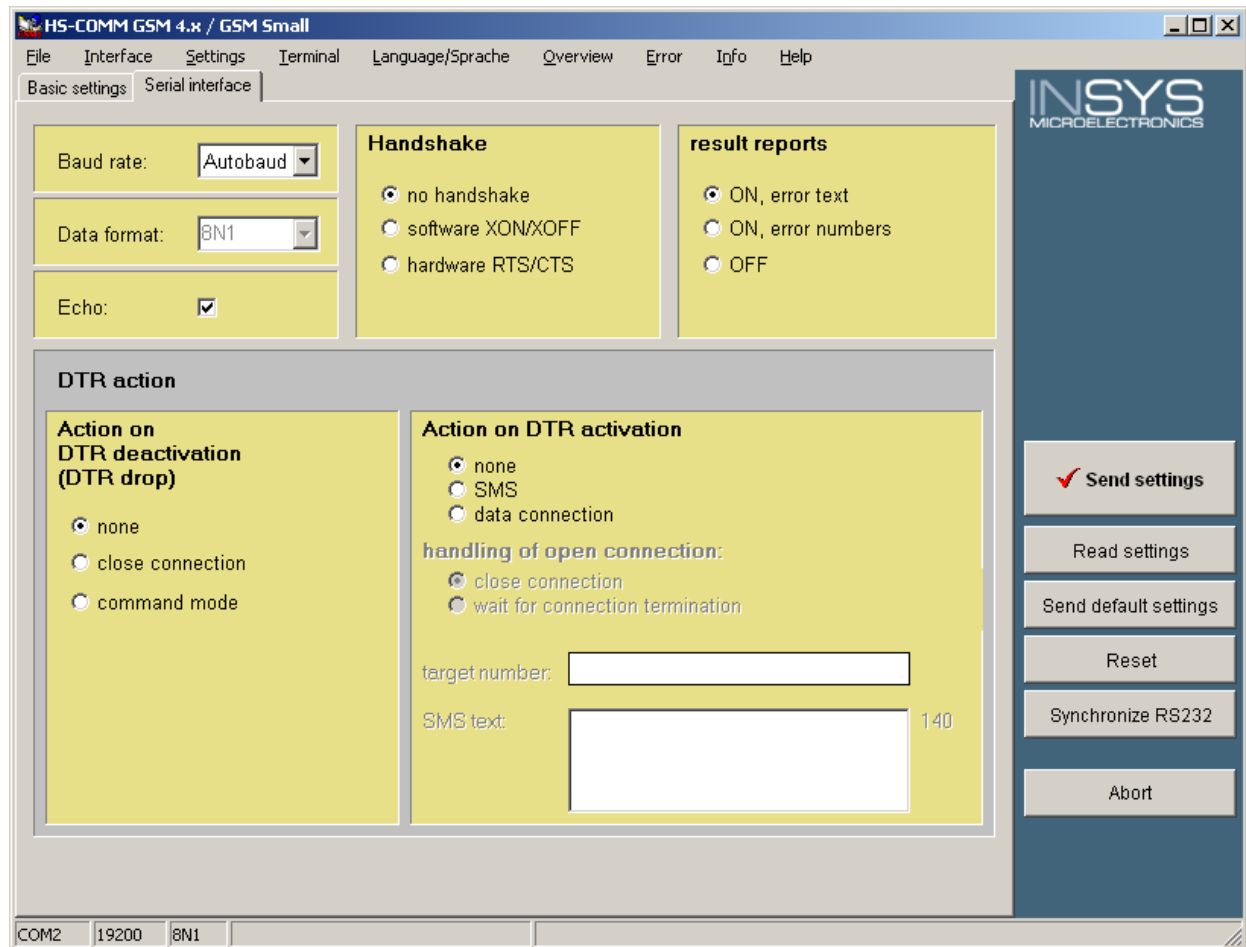
5.3.1 Baud Rate, Data Format and Echo

The settings of the serial interface of the INSYS GSM small must match the parameter settings of the device to be connected.

This concerns the transmission rate (baud rate) and the data format (number of data bits, number of stop bits, and parity).

Auto baud

When auto baud is set, the baud rate and the data format of the connected device is automatically recognized when the first two received characters are "at" (e.g. for the initialization string of a PLC). The auto baud function is only possible for transmission rates of more than 600 baud.

Echo

With echo, all commands which are transmitted via the serial interface are returned to allow local recording in terminal operation.

5.3.2 Handshake

The handshake controls the data flow at the serial interface while the data rate is too high at the moment. Software handshake controls the data flow with the control characters (XON/XOFF) via the data lines. Hardware handshake uses the separate control lines RTS/CTS of the serial interface.

Without handshake, overflowing data is ignored.

Attention!   Handshake must be deactivated when the INSYS GSM small is operated with a device that does not support the according handshake.

5.3.3 Responses

The response format of the GSM small after an AT command or a system message (`CONNECT, NO CARRIER, OK, etc.`) can be set as text or numerical code; it can also be switched off, if necessary.

5.3.4 DTR Behavior

The control line DTR of the serial interface indicates whether a device (configuration PC, control) is connected with the INSYS GSM small and is active. The setting controls the behavior when the DTR signal is missing, e.g. when the terminal device (PC, control) is disconnected.

Reaction to DTR deactivation

When the DTR signal changes from 1 to 0, it can be set whether an existing connection is cleared, the GSM small switches into command mode, or no DTR behavior takes place.

Reaction to DTR activation

When the DTR signal changes from 0 to 1, a data connection can be established automatically, an SMS can be sent, or no DTR behavior takes place.

To establish a data connection or to send an SMS, the target number must be entered into the field below. For sending an SMS, you must always allocate an SMS text.

Behavior of existing connections

This setting is only possible, when "data connection" or "SMS dispatch" has been selected for the setting "Reaction to DTR activation".

Attention!   The DTR function must be deactivated when the INSYS GSM small is operated with a device that does not support DTR.

6 Function Description

6.1 Data Connection

6.1.1 General

ATD22243	Dial number to which a connection is to be set up (always with dialing code, except for special provider numbers).
CONNECT 9600/RLP	The call is accepted. The data is exchanged over the GSM network.
+++	Changing from data mode to online AT command mode. Before and after this "Escape sequence", there must be one second message "Silent" on the TXD line to the INSYS GSM small.
	The connection still remains, but no characters are transmitted to the other modem anymore.
ATH	Hang up (terminate connection to the other party)
or	
ATO	Return to data mode
NO CARRIER	The other party has terminated the connection

6.1.2 Connection to ISDN TAs

To call an ISDN TA it is necessary to change to the ISDN protocol V.110. While doing so it must be observed that the remote terminal has to work with the same protocol as well. Example for V.110 with a data rate of 9600 bps: **AT+CBST=71,0,1**

6.1.3 Connection Acceptance

The connection acceptance for incoming calls takes place either automatically with **ATS0=x** or manually by entering **ATA** after a **RING**.

6.1.4 Disconnection

Connections can be terminated as follows:

* Manually by the **ATH** command in online command mode
* If the remote terminal hangs up
* By DTR drop

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6.2   SMS Dispatch

Example of a text SMS.

`AT+CMGF=1`   Set SMS text mode

`AT+CSCA="<Service Center Number>"`   SMS service center number

`AT+CMGS="<target number>"`   Target number

`>Hello, this is a test<Ctrl Z>`   Prompt >, enter SMS text here,
                                              finish text entry with Ctrl Z (0x1A);
                                              the INSYS GSM small starts to
                                              send the SMS message

Here you have to note that the service center number and the telephone number are placed in **""**.

The service center number must be written in international format, e.g. for a German provider with **„+49"**.

After entering the target number (finalize with **<CR>**), the prompt for the SMS text > appears. The text entry has to be completed with **<CTRL Z>** (not with **<CR>**!).

6.3   Automatic Execution of AT Commands During Operation

6.3.1 General

The command **AT^SCFG** offers the possibility to carry out functions time-controlled or through activating the DTR control line (AT commands).

For time-controlled routines, 3 actions can be configured altogether.
To trigger via DTR, an action can be configured.
For time-controlled functions, the internal timers start from the beginning after a restart or a reset. This also applies if **ATZ** or **AT&F** are entered!

In the following, the most important functions for an application are listed by way of examples. These examples are also used in the HSComm for GSM small:

- Automatic PIN input/registering after restart
- Automatic reset
- Alarm signal via DTR control line

When all functions in the configuration software HSComm are configured, then all storage locations are in use.

Attention!   The settings of this command are only stored with the command **AT^SMSO**.

6.3.2 Automatic PIN Input and Registering After Restart

`AT^SCFG="AutoExec",1,1,0,0,"AT+COPS=0","000:00:06"`

`AT^SCFG="AutoExec",1,1,1,0,"AT+CPIN=0000","000:00:10"`

Meaning: 6 seconds after a restart/reset, the command `AT+COPS=0` is automatically executed to allow the engine to automatically register itself at the GSM network after the PIN input.

This is indicated at the serial interface:

`^SCFG: "AutoExec",1,1,0,0,"AT+COPS=0"`

4 seconds later - that is 10 seconds after a restart/reset - the PIN is sent to the SIM card (here `0000`) with the command **AT+CPIN=…** .

This is indicated at the serial interface:

`^SCFG: "AutoExec",1,1,1,0,"AT+CPIN=0000"`

After this sequence the INSYS GSM small is registered at the network.

The settings can be deactivated by entering the following:

`AT^SCFG="AutoExec",0,1,0`

`AT^SCFG="AutoExec",0,1,1`

Attention!   The settings of this command are only stored with the command **AT^SMSO**.
                   The PIN input can be traced via the serial interface.

For time-controlled functions, the internal timers start from the beginning after a restart or a reset. This also applies if **ATZ** or **AT&F** are entered!

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6.3.3 Automatic Reset

To avoid a faulty registering status of the INSYS GSM small during infrastructure changes of the GSM network (software updates of the databases, temporary network extensions, e.g. for fairs), the device should be periodically unregistered and re-registered, or re-started and initialized.

For this, the following command must be configured in addition:
`AT^SCFG="AutoExec",1,1,2,0,"AT+CFUN=1,1","024:00:00"`

After the set time has expired (in the example 24 hours), the INSYS GSM small carries out a software reset. After this reset, the configured functions will again be performed.
This is indicated at the serial interface:
`^SCFG: "AutoExec",1,1,2,0,"AT+FUN=1,1"`

The setting can be deactivated by entering the following:
`AT^SCFG="AutoExec",0,10.2`

The settings of this command are only stored with the command `AT^SMSO`.

For time-controlled functions, the internal timers start from the beginning after a restart or a reset. This also applies if `ATZ` or `AT&F` are entered!

Therefore, with these examples all 3 actions for time-controlled routines are in use:
`AT^SCFG="AutoExec",1,1,0,0,"AT+COPS=0","000:00:06"`
`AT^SCFG="AutoExec",1,1,1,0,"AT+CPIN=0000","000:00:10"`
`AT^SCFG="AutoExec",1,1,2,0,"AT+CFUN=1,1","024:00:00"`

6.3.4 Alarm Signal Via DTR Control Line

With the command **`AT^SCFG`**, you have the possibility to configure an action. This can be used to establish a data connection or to send an SMS.
The action is performed as soon as the DTR control line is active (e.g. when a COM port is open at a PC).

Establishing a data connection

`AT^SCFG="AutoExec",1,0,0,0,"ATD0123456789"`

When activating the DTR control line from the application, a data connection to the specified number (here 0123456789) is established.
This is indicated at the serial interface:

`^SCFG: "AutoExec",1,0,0,0,"ATD0123456789"`
`CONNECT 9600/RLP`

In this case already existing data connections are ignored, i.e. establishing alarm connections would fail in this situation.

If you want to wait until an already existing data connection ends, you have to enter
`AT^SCFG="AutoExec",1,0,0,1,"ATD0123456789"`.

If you want to terminate an existing data connection for the case of an alarm, the following must be entered:
`AT^SCFG="AutoExec",1,0,0,2,"ATD0123456789"`.

The setting can be deactivated by entering the following:
`AT^SCFG="AutoExec",0,0,0`

The settings of this command are only stored with the command `AT^SMSO`.

Note: With DTR activation it is basically also possible to establish a data connection using the setting `AT%D` ; the setting with `AT^SCFG`, however, offers more possibilities. For this reason we are not elaborating on `AT%D` within the framework of this document.

Sending an SMS

For this, some default settings are necessary:

`AT+CMGF=1`	Set SMS text mode
`AT+CSCA="<Service Center Number>"`	SMS service center number
`AT+CMGD=1`	Delete SMS at the storage location 1, then the following configured SMS will be specifically stored at the storage location 1.
`AT+CMGW="<target number>"`	Target number
`>Alarm message INSYS GSM small <Ctrl Z>`	Prompt >, enter SMS text here, finish text entry with Ctrl Z (0x1A);

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When entering the service center number and the telephone number you have to place them in **""**.

The service center number must be written in international format, i.e. for a German provider with a leading **„+49"**.

After entering the target number (finalize with **<CR>**), the prompt for the SMS text **>** appears. The text entry has to be completed with **<CTRL Z>** (not with **<CR>**!).

Save the settings so far with

`AT&W`

Now, the actual alarm function is configured:

`AT^SCFG="AutoExec",1,0,0,0,"AT+CMSS=1"`

When activating the DTR control line from the application, the SMS at the storage location 1 (`AT+CMSS=1`) is sent to the stored target (0170123456789).

This is indicated at the serial interface:

`^SCFG: "AutoExec",1,0,0,0,"AT+CMSS=1"`
`OK`
`+CMSS: 23`

The message **"+CMSS: 23"** returns the number of SMS messages already sent with this SIM card.

In this case already existing data connections are ignored, i.e. sending SMS messages would fail in this situation.

If you want to wait until an already existing data connection ends, you have to enter

`AT^SCFG="AutoExec",1,0,0,1," AT+CMSS=1"`

If you want to terminate an existing data connection for the case of an alarm, the following must be entered

`AT^SCFG="AutoExec",1,0,00.2," AT+CMSS=1"`

.

The setting can be deactivated by entering the following:

`AT^SCFG="AutoExec",0,0,0`

The settings of this command are only stored with the command **AT^SMSO**.

6.4 Sleep, Power Down and RTC Functionality

6.4.1 General

The following paragraphs show an overview of the extended functions of the INSYS GSM small in view of the different energy saving modes. For in-depth information and the AT commands used for it we refer to the AT command set for the Siemens TC35i.

In addition, the INSYS GSM small has an integrated real time clock (RTC, no power reserve), which can also be used in connection with the sleep and power down modes.

6.4.2 RTC Functionality

Time/date

The internal real time clock of the INSYS GSM small can be set using the following command:

`AT+CCLK=<time>`

`<time>`   is the time in the format `"yy/mm/dd,hh:mm:ss"`.

Example: 06. May 2005, 15.30 and 25 seconds.
                `AT+CCLK="04/05/06,15:30:25"`

When switching off the supply voltage, the time is set to `„02/01/01,00:00:00"` (default).

After a restart (reset or power up) the RTS needs 2 seconds for initialization. We recommend to wait 2 seconds until the message `^SYSTART` is shown before entering the commands `AT+CCLK` and `AT+CALA` 2.

The clock keeps running while the INSYS GSM small is in power down mode,

but there is not power reserve for an interruption of the operating voltage.

Alarm time

An alarm time can be defined for the internal RTC:

`AT+CALA=<time>[,<n>[,<type>[,<text>]]]`

`<time>`   is the time in the format `"yy/mm/dd,hh:mm:ss"`.
`<n>`   is reserved for future functionality, must be 0.
`<type>`   is reserved for future functionality, must be 0.
`<text>`   is an additional text which should be displayed during the alarm time via the serial interface; maximum length = 16 characters.

Example: Reminder on May 31, 2004, 9:30 am with the message: **"Good morning"**
                `AT+CALA="04/05/31,09:30:00",0,0,"Good Morning"`

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When the INSYS GSM small is in normal mode during the alarm time, the following message appears:

`+CALA: Good morning`

When the INSYS GSM small is in power down mode during the alarm time, the RTC alarm mode is entered with the message:

`^SYSSTART ALARM MODE`

`+CALA: Good morning`

After an alarm has occurred, the alarm time is set to "`00/01/01,00:00:00`"; the parameter `<text>` is maintained.

6.4.3 Change of Status

In the following, please find a brief overview of the possible changes to and from the various operating modes.

The possibilities in sleep mode depend on the sleep mode settings with **`AT+CFUN`** (see sleep modes).

Next mode / Current mode	Normal	Sleep	Power Down	Power Down RTC Alarm
Normal	- - -	`AT+CFUN`	`AT^SMSO`	- - -
Sleep	- Reset via reset terminal - RTS negative edge - Non-synchronized event code - Incoming call - AT command - Incoming SMS - RTC alarm - `AT+CFUN=1`	- - -	`AT^SMSO`	- - -
Power Down:	- Reset via reset terminal	- - -	- - -	RTC-Alarm
Power Down RTC Alarm	- Reset via reset terminal	- - -	`AT^SMSO`	- - -

6.4.4 Sleep Modes

Attention!   Sleep modes only function correctly when the PIN of the SIM card has been authenticated. (Either by entering the PIN with **AT+CPIN** or by deactivating the PIN query.)

6.4.4.1 Sleep Mode Off (Normal Mode)
AT+CFUN=1
This is normal operation.

6.4.4.2 NON Cyclic Sleep Mode
AT+CFUN=0
In this sleep mode the serial interface is deactivated.

Each possible "wake-up event" in this mode (besides AT commands) causes the INSYS GSM small to switch to normal mode.

6.4.4.3 Cyclic Sleep Mode
AT+CFUN=5, AT+CFUN=6, AT+CFUN=7, AT+CFUN=8

Common to all these sleep modes is that they poll the serial interface periodically to use AT commands without leaving the sleep mode.

In each cyclic sleep mode the application as well as the INSYS GSM small should use hardware handshake, because the INSYS GSM small indicates by activating or deactivating the CTS control line that it is currently receiving AT commands (polling).

The polling cycle of the serial interface is linked to the so-called paging queries of the INSYS GSM small to the GSM base station and lasts between 0.47 and 2.12 seconds.

For each polling the CTS line is active for 4.7 ms, then further 4.6 ms activity of the serial interface of the INSYS GSM small follow (ready to receive). When within those 9.2 ms the start bit of a character is detected on the serial interface, CTS stays active and the character is received.

After a character was received the serial interface stays active:

- 2 seconds for **AT+CFUN=5** or **AT+CFUN=7**
- 10 minutes for **AT+CFUN**=6 or **AT+CFUN=8**

CTS is also activated when the INSYS GSM small sends characters to the application within the framework of non-synchronized event codes.

In the intervals between the paging queries, CTS is inactive and therefore also the serial interface.

When **AT+CFUN=5** and **AT+CFUN=6** is set, the sleep mode is permanently exited after an SMS or a connect, and the INSYS GSM small runs again in normal mode (**AT+CFUN=1**).

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When **AT+CFUN=7** and **AT+CFUN=8** is set, the sleep mode is re-entered after an SMS or a Connect.

When entering **AT+CFUN=1**, the sleep mode is in all cases exited permanently and the system is set to normal mode.

6.4.4.4 Exiting the Sleep Mode

Waking up the INSYS GSM small from sleep mode to normal mode (equivalent to **AT+CFUN=1):**

Sleep mode Event	AT+CFUN=0	AT+CFUN=5 or AT+CFUN=6	AT+CFUN=7 or AT+CFUN=8
Reset via reset terminal	YES	YES	YES
RTS negative edge	YES	NO	NO
Non-synchronized event code	YES	YES	Temporary; device enters sleep mode after 2 s ((AT+CFUN=7) or 10 minutes (AT+CFUN=8)
Incoming connection	YES	YES	Temporary; device enters sleep mode after 2 s ((AT+CFUN=7) or 10 minutes (AT+CFUN=8) after the connection was ended
Any AT command (except AT+CFUN=1)	NO	Temporary; device enters sleep mode after 2 s ((AT+CFUN=5) or 10 minutes (AT+CFUN=6)	Temporary; device enters sleep mode after 2 s ((AT+CFUN=7) or 10 minutes (AT+CFUN=8)
Incoming SMS (for AT+CNMI=1,1); equivalent to a non-synchronized event code	YES	YES	Temporary; device enters sleep mode after 2 s ((AT+CFUN=7) or 10 minutes (AT+CFUN=8)
RTC alarm; equivalent to a non-synchronized event code	YES	YES	Temporary; device enters sleep mode after 2 s ((AT+CFUN=7) or 10 minutes (AT+CFUN=8)
AT+CFUN=1	NO	YES	YES

6.4.5 Power Down Mode

6.4.5.1 Changes in Power Down Mode
The Power Down Mode is entered using the command `AT^SMSO.`
The GSM engine switches itself off, only the RTC is still active.

The following routine takes place with `AT^SMSO:`
```
AT^SMSO
^SMSO: MS OFF
OK
^SHUTDOWN
```

In the power down mode, the serial interface is inactive, the outputs (RXS, CTS, DCD, DSR, and RI) are highly resistive.
To avoid "floating" of the according inputs of the application in that case, these inputs should have pull-up or pull-down resistors.

In power down mode the INSYS GSM small is not registered at the GSM network.

ATTENTION: Besides shutting down the GSM engine, the command `AT^SMSO` has a second function as well. Some of the extended AT commands can only be stored using this command (`AT^SCFG, AT+CSNS, AT^SCKS, AT+CALA`).

After entering `AT^SMSO` it is therefore required to wait for the response `^SHUTDOWN`, before the supply voltage is disconnected.

As for each shutdown, data is written into the non-volatile memory of the GSM engine with **AT^SMSO** , the maximum number of "shutdowns" is limited to 100,000.

6.4.5.2 Power Down RTC and Alarm Mode

As the internal real time clock (RTC) keeps running in power down mode, the alarm function of the RTC (`AT+CALA`) can be used to switch the INSYS GSM small from power down into RTC alarm mode.

If a set RTC alarm occurs during the time period in which the INSYS GSM small is in power down mode, the RTC alarm mode is entered with the following message:
```
^SYSSTART ALARM MODE
[+CALA: <text>]
```

If a text was configured together with the command **`AT+CALA`** using additional parameters, this text will appear in the second message line.

If an alarm occurs, the alarm time set with **`AT+CALA`** is deleted and can be set once more in the RTC alarm mode.

In this state only very limited operation is possible; the following AT commands may be used:

`AT+CCLK` (Set time/date)

`AT+CALA` (Set alarm time)

`AT^SMSO` (Changes in power down mode)

To put the INSYS GSM small into normal operation, it is necessary to perform a reset via the reset terminator.

6.4.5.3 Exiting the Power Down Mode

Exiting the power down mode is only possibly by performing a reset via the reset terminator of the INSYS GSM small (see 3.2.4 Reset).

7   Command Overview

7.1   General Information Regarding the Command Sets

The AT commands can only be entered locally via the serial interface if the device is either in offline state (no active data connection) or on online command mode (interrupted data connection). This document lists the most important commands. The complete AT command set of the GSM engine TC35i is available on request.

The modem guideline V.25ter is applicable with regard to the time sequence of interface commands.

The AT standard is a line-oriented command language. Each command consists of three elements: Prefix, body and end character.

The prefix always consists of the letters "AT"; the only exception is the command "A/".

The main part consists of the command name and pertinent parameters, if applicable.

Parameters are always displayed in angular brackets <...>. If parameters are optional, this is additionally indicated by square brackets [...].

The input is not context-sensitive.

All commands are finalized using the carriage return character set which is set with the command **ATS3** (Default = **<CR>** = 0x0D). The backspace character which is set with the command **ATS5** can be used to delete falsely entered characters.
(Default = **<BS>** = 0x08).

Each command is acknowledged with a response according to V.25ter (set with **ATV**):

Response	Code	Type	Meaning
OK	0	Final	Command executed, no error
CONNECT	1	Final	Connection established if parameter setting X=0
CONNECT [<text>]		Final	Connection established if parameter setting X>0 **<text>**: E.g. 'CONNECT 9600/RLP'. The data transmission rate is then 9.600 bit/s.
RING	2	Non-synchronized	Ring tone recognized
NO CARRIER	3	Final	Connection not established or disconnected
ERROR	4	Final	Invalid command or command line too long
NO DIALTONE	5	Final	No dial tone, connection setup not successful, wrong operating mode
BUSY	6	Final	Remote terminal busy
NO ANSWER	7	Final	Timeout for connection setup

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To ease readability of the further comments, **<CR>** is always used as carriage return character. The standard responses are always **OK** or **ERROR** , regardless of the actually selected responses according to V.25.

After the response to a command, a waiting period of at least 100 ms is recommended before the next command to enable the sending of more non-synchronous event codes, if necessary.

For lining up standard AT commands please refer to the detailed command set of the GSM engine.

7.2   Short Description AT commands

The AT commands comprise the specification according to V.25ter, GSM 07.07 and GSM 07.05. Only the most important AT commands with syntax and parameters are described in the following. A complete command reference of the Siemens TC35i is available from INSYS MICRO-ELECTRONICS (e-mail: insys@insys-tec.de).

The applicability of single features may depend on the functionality of the selected GSM network.

Syntax: **<expressions>** in angular brackets stand for parameters.

[expressions] in square brackets stand for optional entries.

Default settings are set off in **bold**.

7.2.1 AT Commands According To V.25ter

+++	Change from data mode to command mode (online command mode). 1 second pause before and after the entry, no **<CR>.**
ATA	Call acceptance (see also **ATS0** for automatic call acceptance)
ATD[<n>]	Dialing the phone number **<n>**.
ATDL	Last number re-dialing
ATE<n>	Set command echo: **<n>** 0 Off **1** **on**
ATH	Terminate existing connection
ATI	Output of product information of the GSM engine
ATO	Switch back from command mode to data mode

ATQ<n>	Sets result code presentation mode
	<n> 0 Result codes are transmitted
	1 **Result codes are not transmitted**

| ATS0? | Query automatic auto answer |

ATS0=<n>	Auto answer after <n> call signals (RING)
	<n> **0** **off**
	1..255 on

ATV<n>	Set format mode for result code
	<n> 0 Short response (numerical code)
	1 **Response in text form**

ATX<n>	Sets CONNECT result code format and connection monitoring
	<n> 0 Numerical response for **CONNECT**, no dial tone detection, no busy detection
	1 Text response for **CONNECT**, no dial tone detection, no busy detection
	2 Text response for **CONNECT**, dial tone detection, no busy detection
	3 Text response for **CONNECT**, no dial tone detection, busy detection
	4 **Text response for CONNECT, dial tone detection, busy detection**

| ATZ | Resets all current parameters to user profile, an existing connection will be terminated. |
| | The timers for time-controlled automatic functions possibly set with AT^SCFG will restart here (see also: "6.3 Automatic Execution of AT Commands during Operation). |

AT&C<n>	Set function type of the control line DCD
	<n> 0 DCD is always active
	1 **DCD shows the presence of the carrier signal**

AT&D<n>	Set function type of the control line DTR (change ON→OFF)
	<n> 0 Ignored
	1 Change to command mode, connection maintained
	2 **Change to command mode, connection terminated, no automatic connection acceptance while DTR off**

| AT&F | Set all current parameters to factory defaults |
| | The timers for time-controlled automatic functions possibly set with AT^SCFG will restart here (see also: "6.3 Automatic Execution of AT Commands during Operation). |

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`AT&S<n>`	Sets function type of the control line DSR
	`<n>` **0** **DSR always on**
	1 Device in command mode: DSR off
	2 Device in data mode: DSR on
`AT&V`	Displays current configuration
`AT&W`	Store current configuration
`AT\Q<n>`	Data flow control of the serial interface
	`<n>` **0** **Off**
	1 Software handshake (XON/XOFF)
	2 Only CTS
	3 Hardware handshake (RTS/CTS)
	ATTENTION: In hardware handshake mode, the INSYS GSM small can still supply up to 264 data bytes (worst case) after the application has deactivated the RTS signal.
`AT+ICF?`	Query the data format of the RS232
	If auto bauding (`AT+IPR=0`) is active, the currently detected data format is not displayed, but the data format which was used for deactivated auto baud.
`AT+ICF=<format>` `[,<parity>]`	Data format of the RS232
	`<format>` 1 8 data bits, 0 parity bits, 2 stop bits
	2 8 data bits, 1 parity bits, 1 stop bit
	3 **8 data bits, 0 parity bits, 1 stop bit**
	4 7 data bits, 1 parity bits, 1 stop bit
	`<parity>` 0 Odd parity
	1 Even parity
	The parameter `<parity>` must only be specified, when a parity bit is specified in the parameter `<format>`.
	The following settings are supported:
	7E1 (`AT+ICF=5,1`)
	7O1 (`AT+ICF=5,0`)
	8E1 (`AT+ICF=2,1`)
	8N1 (`AT+ICF=3`)
	8O1 (`AT+ICF=2,0`)
	8N2 (`AT+ICF=1`)
	For the settings 7E1 and 7O1, the parity is per default not forwarded to the remote terminal. If this is necessary, an additional setting must be performed

	with the command **AT^STPB**. For the formats 8E1 and 8O1, the parity bits are generally not transmitted. For a data rate of 300 bps, an interruption of 500 ms after <OK> must be observed after this command until the next command is sent. For baud rates of 600 and 1200 bps the waiting period is 300 ms. If auto bauding is active (**AT+IPR=0**), this also applies for the recognition of the data format (except 8N2).
AT+IPR?	Query the baud rate of the RS232

AT+IPR=<baud>	Baud rate of the RS232
	
	<baud> Specification of the baud rate in bps
	         0 **Auto bauding**
	         300
	         600
	         1200
	         2400
	         4800
	         9600
	         14400
	         19200
	         38400
	         57600
	         115200
	
	This setting is immediately saved (therefore it does not have to be saved with **AT&W**), and is not reset with **AT&F**.
	
	This command should not be in the same command line with other commands.
	
	Auto bauding does not work with baud rates below 1200 bps.
	
	In general we recommend not to work with auto bauding, especially with automatic call acceptance (**ATS0=...**).
	
	If required, we would like to refer to the more detailed AT command set of the TC35i by Siemens, which can be obtained from INSYS Microelectronic GmbH.

AT^STPB?	Query settings for parity bit transmission

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`AT^STPB=<n>`	Transmission of the parity bit (only for the data formats 7E1 and 7O1)		
	Concerns only the air interface!		
	`<n>`	**0**	**The parity bit is not sent via the air interface and is replaced by 0.**
		1	The parity is correctly sent via the air interface as the 8th bit. This setting should be used when problems occur with the data formats 7E1 or 7O1 during data transmissions.

7.2.2 AT Commands For GSM Connection

`AT+CBST?`	Queries transmission service type		
`AT+CBST=<n>`	Sets transmission service type to modem and ISDN TA		
	`<n>`	0	Auto bauding
		4	2400 bps (V.22bis)
		6	4800 bps (V.32)
		7	9600 bps (V.32) - default
		14	14400 bps (V.32)
		68	2400 bps (V.110)
		70	4800 bps (V.110)
		71	9600 bps (V.110)
		75	14400 bps (V.110)
`AT+COPS?`	Display selected network provider		
`AT+COPS=<n> [,<format>, <oper>]`	Select network provider		
	`<n>`	0	Automatic (default)
		1	Manual selection `<oper>`
		2	Unregister from GSM network
		4	Manual selection `<oper>` - automatic selection if not accessible
	`<format>`	0	Alphanumerical information (up to 16 digits) for `<oper>` (default)
		2	Numerical information for `<oper>`
	`<oper>`		Information of the network provider : see Chap. 8
`AT+CPIN?`	Query required PIN		
	Response (selection):		
		`READY`	No input required
		`SIM PIN`	Enter SIM card PIN
		`SIM PUK`	Enter PUK of the SIM card (after repeated false entry of the PIN)
		`ERROR`	SIM card not inserted

AT+CPIN=<n>	Enter PIN of the SIM card:
	<n> 4 digit number

AT+CREG?	Display registration state (network state)
	Response: **<n>,<stat>** OK
	<stat> 0 Not registered, no GSM network search
	1 Registered at standard provider
	2 Not registered, GSM network search
	3 Refused
	5 Registered, roaming

AT+CSQ	Display signal quality (intensity of the GSM signal)
	Response: **<rssi>,<ber>**
	<rssi> 0..10 Poor GSM signal, change location
	11..31 Good GSM signal
	99 Not detectable

7.2.3 AT Commands For SMS

AT+CSCA?	Query number of the SMS service center

AT+CSCA=<nr>	Set number of the SMS service center
	<no> Number in international format (e.g. Germany: +49…)

AT+CMGF?	Query SMS message format

AT+CMGF=<n>	Set SMS message format
	<n> 0 PDU mode – default
	1 Text mode

AT+CMGD=<n>	Delete SMS message **<n>** from memory

AT+CMGL=<stat>	List SMS message in memory
	<stat> 0 unread messages
	1 read messages
	„ALL" All messages

AT+CMGR=<n>	Read SMS message **<n>** from memory; the message status **<n>** changes from unread to read.

AT+CMGS=<nr> <CR><text> <Ctrl-Z>	Send SMS Message directly:
	<no> Phone number
	<CR> Enter/return key
	<text> Text of the SMS message
	<Ctrl-Z> Press the Ctrl key and Z (0x1A)
	The phone number is completed with **<CR>**, the text with **<Ctrl-Z>**.

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`AT+CMGW=<nr><CR><text><CTRL-Z>`	Save SMS Message:
	`<no>` Phone number
	`<CR>` Enter/return key
	`<text>` Text of the SMS message
	`<Ctrl-Z>` Press the Ctrl key and Z (0x1A)
	The phone number is ended with `<CR>`, the actual text with `<Ctrl-Z>`.
	In this case, the SMS is not sent, but stored in the next free memory.
	After the text is finalized with `<CTRL-Z>`, acknowledgement takes place with `+CMGW: <n>` , where `<n>` stands for the number of the storage location.
`AT+CMSS=<n>`	Send SMS message from the memory:
	`<n>` Number of the storage location

7.2.4 AT Commands For Energy Saving Functions

`AT+CFUN?`	Display operation mode (sleep/normal mode)
`AT+CFUN=<fun>[,<rst>]`	Set operating mode; see explanations in "6.4.4 Sleep Modes"
	`<fun>` 0 NON-CYCLIC SLEEP mode
	1 Normal mode, full functionality of the INSYS GSM small
	5 CYCLIC SLEEP mode 5
	6 CYCLIC SLEEP mode 6
	7 CYCLIC SLEEP mode 7
	8 CYCLIC SLEEP mode 8
	`<rst>` 0 No meaning
	1 The GSM engine of the INSYS GSM small performs a software reset; the value for `<fun>` is irrelevant in this case, it only serves as a wildcard
`AT^SMSO`	Switch GSM engine to power down mode; see explanations in "6.4.5 Power Down Mode"

7.2.5 AT Commands For Time Functions

`AT+CCLK?`	Display current time and date
`AT+CCLK=<time>`	Set time and date; see explanation in "6.4.2 RTC Functionality"
`AT+CALA?`	Display alarm time settings
`AT+CALA=<time>[,<n>[,<type>[,<text>]]]`	Set alarm time; see explanations in "6.4.2 RTC Functionality"

7.2.6 AT Commands for Automatic Functions

`AT^SCFG?`	Query settings for automatic execution of AT commands
`AT^SCFG="AutoExec",<cmd>,<type>,<index>[,<mode>,<ATCmd>[,<period>]]`	Automatic execution of AT commands For a detailed description please refer to the AT command set of the GSM engine TC35i. Examples can be found in "6.3 Automatic Execution of AT Commands During Operation" Attention: These settings must be stored with `AT^SMSO`. The timers for time-controlled automatic functions start to rerun with restart, with `AT+CFUN=x,1`, `AT&F` and `ATZ`.

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8 Network Provider Identification Numbers

Identifiers and names of the network providers (GSM Location Area Identification Number) for the GSM module in alphabetic order – for the commands **AT+COPS**, **AT**PROVIDER** (output for model TC35i Firmware V2.7).

The following table can be output with the command AT^SPLM.

Code	Name	Code	Name	Code	Name	Code	Name
232103	AT	20620	BASE	40477	BSNL MOBILE	36269	CT GSM
505063	AUS	36439	BaTelCell	40479	BSNL MOBILE	36801	CU/C_COM
454033	HK	42601	BATELCO	40480	BSNL MOBILE	28001	CY CYTAGSM
222993	ITA	61604	BBCOM	40481	BSNL MOBILE	310940	DCT
240023	SE	47003	BD ShebaWorld	40211	BT B-Mobile	50216	DiGi
234203	UK	25099	BEE LINE	35002	BTC MOBILITY LTD	70602	DIGICEL
4170294	SYRIA	20601	BEL PROXIMUS	70267	BTL	73402	DIGITEL TIM
23201	A1	61302	BF CELTEL	65201	BW MASCOM	63801	DJ EVATIS
46668	ACeS	28405	BG GLOBUL	25701	BY VELCOM	60302	Djezzy
51000	ACeS	47002	BGD AKTEL	20820	BYTEL	23802	DK SONOFON
51511	ACeS	47001	BGD-GP	338180	C&W	21403	E AMENA
52020	ACeS	21890	BH GSMBIH	342600	C&W	62120	ECONET NG
41201	AF AWCC	43701	BITEL	346140	C&W	24801	EE EMT GSM
41220	AF TDCA	61603	BJ BENINCELL	23455	Cable & Wireless	24802	EE RLT
60702	AFRICELL	73602	BOMOV	45618	CAMSHIN	60201	EGY MobiNiL
40402	AirTel	34020	BOUYGTEL-C	63089	CD OASIS	61710	EMTEL-MRU
40403	AirTel	40421	BPL MOBILE	65507	CELL C	26203	E-Plus
40410	AirTel	40427	BPL MOBILE	310560	Cell One	26002	Era
40431	AirTel	40443	BPL MOBILE	63004	CELLCO GSM	70601	ESV PERSONAL
40445	AirTel	40446	BPL MOBILE	61701	CELLPLUS-MRU	63601	ETH-MTN
40449	AirTel	72405	BRA CL	65010	CELTEL	45702	ETLMNW
40490	AirTel	52811	BRU-DSTCom	62901	CELTEL CD	23002	EUROTEL - CZ
40492	AirTel	40434	BSNL MOBILE	62803	CELTEL GA	23102	EUROTEL-SK
40493	AirTel	40438	BSNL MOBILE	63002	CELTEL RC	25028	EXTEL RUS
40494	AirTel	40451	BSNL MOBILE	61901	CELTEL SL	65102	EZI-CEL
40495	AirTel	40453	BSNL MOBILE	62201	CELTEL TCD	20810	F SFR
40496	AirTel	40454	BSNL MOBILE	64005	CELTEL TZ	46601	FarEasTone
40497	AirTel	40455	BSNL MOBILE	46000	China Mobile	41601	Fastlink
40498	AirTel	40457	BSNL MOBILE	46001	China Unicom	24414	FI AMT
42001	ALJAWAL	40458	BSNL MOBILE	61201	CI CORA	24409	FI FINNET
27601	AMC-AL	40459	BSNL MOBILE	310410	Cingular	24405	FI RADIOLINJA
60301	AMN	40462	BSNL MOBILE	310150	Cingular	24491	FI SONERA
34430	APUA-PCS	40464	BSNL MOBILE	310170	Cingular	24403	FI TELIA
72234	AR PERSONAL	40466	BSNL MOBILE	73001	CL ENTEL PCS	24412	FI2GFI12
722310	ARG CTI Movil	40471	BSNL MOBILE	73010	CL ENTEL PCS	302370	Fido
3E+05	AT&T Wireless	40472	BSNL MOBILE	62910	COG LIBERTIS	29505	FL1
40001	AZE-AZERCELL GSM	40473	BSNL MOBILE	732103	COL MOVIL	64702	F-OMT
20610	B mobistar	40474	BSNL MOBILE	732101	COMCEL	34001	F-Orange
21803	BA-ERONET	40475	BSNL MOBILE	62501	CPV MOVEL	55001	FSM Telecom
40002	BAKCELL GSM 2000	40476	BSNL MOBILE	45400	CSL	28801	FT-GSM

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54720 F-VINI	40440 INA AIRTEL	24702 LV TELE2	20408 NL KPN
62802 GAB TELECEL	40430 INA HUTCH	45501 MAC-CTMGSM	20412 NL Telfort
60701 GAMCEL	40420 INA MaxTouch	28202 MAGTI-GSM-GEO	26207 o2 - DE
28201 GEO-GEOCELL	40441 INA RPG	61001 MALITEL ML	27202 O2 - IRL
62002 GH ONEtouch	51001 IND SATELINDOCEL	64111 mango	23410 O2 - UK
62001 GH SPACEFON	51010 IND TELKOMSEL	23458 Manx Pronto	27403 Og Vodafone
62003 GH-MOBITEL	40412 INDEH	25902 MD MOLDCELL	72431 Oi
26601 GIBTEL GSM	40419 INDEK	25901 MD VOXTEL	42202 OMAN MOBILE
62150 Glo NG	40456 INDEU	25002 MegaFon	24601 OMNITEL LT
51502 Globe	40470 INDH1	64602 MG ANTARIS	23205 one
61102 GN LAGUI	43602 Indigo-T	64601 MG Madacom	23433 Orange
62701 GNQ01	40468 IN-DOLPHIN	61902 MILLICOM SL	23830 Orange
27821 go mobile	40469 IN-DOLPHIN	29402 MKD COSMOFON	37001 orange
20201 GR COSMOTE	70268 INTELCO	29401 MKD-MOBIMAK	65202 Orange
20209 GR Q-TELECOM	43214 IR KISH	41401 MM 900	62402 Orange CAM
20210 GR TELESTET	43219 IR MTCE	42899 MN MobiCom	22803 Orange CH
21601 H PANNON GSM	27203 IRL-METEOR	26213 MobilCom	61203 Orange CI
31070 Highland	43211 IR-TCI	21805 MOBI'S	20801 Orange F
45410 HK NEW WORLD	27401 IS SIMINN	46693 MobiTai	29502 Orange FL
45404 HK ORANGE	27402 IS TAL	64002 MOBITEL - TZ	20420 Orange NL
45412 HK PEOPLES	51501 Islacom	63401 MobiTel SDN	64700 Orange re
45416 HK SUNDAY	310770 IWS	45601 MOBITEL-KHM	23101 Orange SK
74401 HPGYSA	42505 JAWWAL	22004 MONET	52099 Orange Th
21910 HR VIP	33805 JM DIGICEL	60401 MOR IAM	25011 ORENSOT
21901 HTmobile HR	41677 JO MobCom	60400 MOR MEDITEL	23003 OSKAR
65401 HURI	44010 JP DoCoMo	21407 MOVISTAR	26803 P OPTIMUS
40401 Hutch	44020 J-PHONE	33403 MOVISTAR	26806 P TMN
40405 HUTCH	23450 JT GSM	64301 MOZ-mCel	71401 PANCW
40411 HUTCH	28802 KALL	60901 MR MATTEL	74402 PGY Porthable
40413 HUTCH	46688 KGT	64901 MTC NAMIBIA	51505 PH Sun Cellular
40415 Hutch	45602 KHM-Hello GSM	42602 MTC-VFBH	41003 PK-UFONE
40460 Hutch	54509 KL-Frigate	28401 M-TEL GSM BG	26001 Plus GSM
40484 HUTCH	476193 KP SUN	62130 MTN - NG	53701 PNGBMobile
40486 HUTCH	45002 KR KTF	62401 MTN CAM	74001 PORTA GSM
45503 Hutchison MAC	45008 KR KTF	65510 MTN-SA	72235 PORT-HABLE
22201 I TIM	41902 KT MTCNet	64110 MTN-UGANDA	25092 Primtel
22288 I WIND	41903 KT WATANIYA	25702 MTS BY	22002 ProMonte
71201 I.C.E.	40102 KZ KCELL	25001 MTS-RUS	51011 proXL
26003 IDEA	40101 KZ K-MOBILE	47201 MV DHIMOBILE	310500 PSC Wireless
40404 IDEA	27001 L LUXGSM	65001 MW CP 900	42701 QAT QATARNET
40407 IDEA	27077 L TANGO	50219 MY CELCOM	28304 RA 04
40422 IDEA	45701 LAO GSM	50212 MY Maxis Mobile	28301 RA-ARMGSM
40424 IDEA	45703 LATMOBIL	24202 N NetCom GSM	63510 R-CELL
40478 IDEA	29577 LI TANGO	24201 N Telenor	25012 RF Far East
61002 IKATEL ML	62801 LIBERTIS	25044 NC-GSM	41501 RL Cellis
42502 IL Cellcom	51008 LIPPO TEL	54601 NCL MOBILIS	41503 RL LibanCell
42501 IL Orange	41371 LK Mobitel	61402 NE CELTEL	22601 RO CONNEX
51021 IM-3	24701 LMT GSM	310450 NECCI	22603 RO Cosmorom
310690 IMMIX	61801 LoneSTAR	62140 NG NITEL	22610 RO ORANGE
40442 INA AIRCEL	24602 LT BITE GSM		302720 ROGERS

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25017 RUS 17	62202 TD LIBERTIS	23430 T-Mobile UK	65501 VodaCom-SA
25010 RUS DTC	23801 TDC MOBIL	23431 T-Mobile UK	27602 vodafone AL
25020 RUS ECC	33420 TELCEL	23432 T-Mobile UK	50503 VODAFONE AU
25013 RUS Kuban-GSM	36251 Telcell GSM	50213 TMTOUCH	26202 Vodafone D2
25019 RUS_Bashcell	29001 TELE Greenland	28603 TR ARIA	60202 vodafone EG
25016 RUS16 250 16	24603 TELE2	28604 TR AYCELL	21401 vodafone ES
24007 S COMVIQ	24803 TELE2	28602 TR TELSIM	54201 Vodafone FJ
42101 SabaFon	64803 TELECEL ZW	28601 TR TURKCELL	20205 vodafone GR
63902 Safaricom	61205 TELECEL-CI	46699 TransAsia	21670 Vodafone HU
64202 SAFARIS	35001 TELECOM BDA	37412 TSTT	27201 vodafone IE
25005 SCS RUS	29501 telecom FL	60503 TUNISIANA	22210 vodafone IT
71073 SERCOM	73002 TELEFONICA	60502 TUNTEL	27801 vodafone MT
36301 SETAR GSM	74602 TeleG	46606 TUNTEX	20404 vodafone NL
63301 SEYCEL	23207 telering	46692 TWN Chunghwa	53001 vodafone NZ
63310 SEZ AIRTEL	23820 TELIA DK	46697 TWN GSM 1800	26801 vodafone P
64710 SFR REUNION	24001 TELIA S	352130 TWTCGN	24008 vodafone SE
52503 SGP M1-GSM	63782 Telsom Mobile	25501 UA UMC	23415 vodafone UK
29341 SI MOBITEL GSM	50501 Telstra	42402 UAE ETISALAT	54101 VUT SMILE
29370 SI VEGA 070	61501 TG-TOGO CELL	25505 UA-GT	73401 VZ INFO
29340 SI.MOBIL	52015 TH ACT 1900	25503 UA-KYIVSTAR	21630 WESTEL
25004 SIBCHALLENGE RUS	52001 TH GSM	53901 U-CALL	21404 XFERA
52501 SingTel	52023 TH GSM 1800	64101 UG CelTel	310590 XTNDAREA
52502 SingTel-G18	52018 TH-DTAC	25502 UKR-WellCOM	50502 YES OPTUS
51503 SMART	90105 Thuraya	72207 UNIFON	63903 YES!
45406 SmarTone	71610 TIM	63102 UNITEL	22001 YU MOBTEL
45500 SmarTone	72402 TIM	25039 Uraltel	22003 YUG 03
25007 SMARTS	72403 TIM	310100 US PLATEAU	64003 ZANTEL-TZ
25015 SMARTS	72404 TIM	31080 USA 080	64501 ZM CELTEL
60801 SN ALIZE	50217 TIMECel	310340 USA 340	64804 ZW ECONET
60802 SN-SENTEL SG	43603 TJK MLT	310640 USA AE Airadigm	
43601 Somoncom	43605 TJT - Tajik Tel	310190 USA Dutch Harbor	
63701 SOMTELESOM	61602 TLCL-BEN	310460 USA ONELINK	
42102 SPACETEL	51402 TLS-TT	310790 USA Pinpoint	
64201 Spacetel BI	310740 TLXT	310320 USA-CellularOne	
40414 SPICE	31026 T-Mobile	310910 USAFC	
40444 SPICE	31031 T-Mobile	31040 USATX	
41302 SRI DIALOG	310160 T-Mobile	310530 USA-WVA WIRELSS	
41303 SRI-CELLTEL	310200 T-Mobile	36291 UTS	
21303 STA-MOBILAND	310210 T-Mobile	43405 UZB COSCOM GSM	
52505 STARHUB-SGP	310220 T-Mobile	43404 UZB DAEWOO-GSM	
62601 STP CSTmovel	310230 T-Mobile	43407 UZB-UZD	
22802 Sunrise	310240 T-Mobile	43402 UZMACOM	
65310 Swazi-MTN	310250 T-Mobile	64004 VadaCom	
24004 SWEDEN	310260 T-Mobile	65101 VCL COMMS	
24005 Sweden 3G	310270 T-Mobile	27404 Viking	
22801 SWISS GSM	310660 T-Mobile	73601 VIVA	
41709 SYR MOBILE SYR	23203 T-Mobile A	45201 VN MOBIFONE	
41701 SYRIATEL	23001 T-Mobile CZ	45202 VN VINAPHONE	
46689 T3G	26201 T-Mobile D	63001 VODACOM CD	
45708 TANGO LAO	20416 T-Mobile NL	64304 VodaCOM-MZ	

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